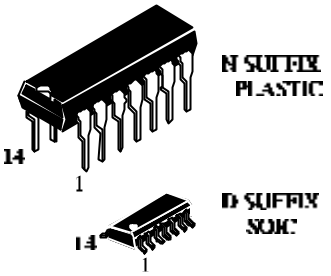
Quad 2-Input NAND Gate with Schmitt-Trigger Inputs

High-Performance Silicon-Gate CMOS

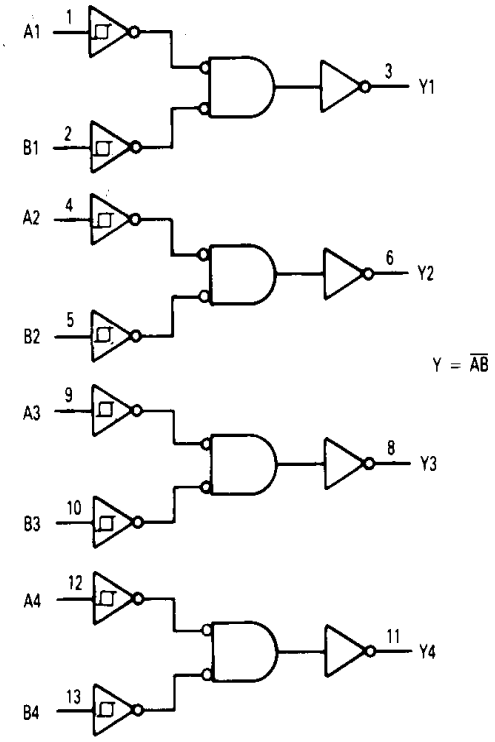
The SL74HCT132 is identical in pinout to the LS/ALS132. The SL74HCT132 may be used as a level converter for interfacing TTL or NMOS outputs to High Speed CMOS inputs.

- TTL/NMOS Compatible Input Levels
- Outputs Directly Interface to CMOS, NMOS, and TTL
- Operating Voltage Range: 4.5 to 5.5 V
- Low Input Current: 1.0 μA



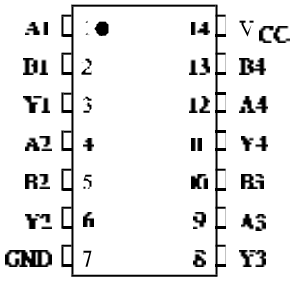
ORDERING INFORMATION
SL74HCT132N Plastic
SL74HCT132D SOIC
T_A = -55° to 125° C for all packages

LOGIC DIAGRAM



PIN 14 =V_{CC}
PIN 7 = GND

PIN ASSIGNMENT



FUNCTION TABLE

Inputs		Output
A	B	Y
L	L	H
L	H	H
H	L	H
H	H	L

MAXIMUM RATINGS*

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply Voltage (Referenced to GND)	-0.5 to +7.0	V
V_{IN}	DC Input Voltage (Referenced to GND)	-1.5 to V_{CC} +1.5	V
V_{OUT}	DC Output Voltage (Referenced to GND)	-0.5 to V_{CC} +0.5	V
I_{IN}	DC Input Current, per Pin	±20	mA
I_{OUT}	DC Output Current, per Pin	±25	mA
I_{CC}	DC Supply Current, V_{CC} and GND Pins	±50	mA
P_D	Power Dissipation in Still Air, Plastic DIP+ SOIC Package+	750 500	mW
Tstg	Storage Temperature	-65 to +150	°C
T_L	Lead Temperature, 1 mm from Case for 10 Seconds (Plastic DIP or SOIC Package)	260	°C

*Maximum Ratings are those values beyond which damage to the device may occur.
Functional operation should be restricted to the Recommended Operating Conditions.
+Derating - Plastic DIP: - 10 mW/°C from 65° to 125°C
SOIC Package: : - 7 mW/°C from 65° to 125°C

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	DC Supply Voltage (Referenced to GND)	4.5	5.5	V
V_{IN}, V_{OUT}	DC Input Voltage, Output Voltage (Referenced to GND)	0	V_{CC}	V
T_A	Operating Temperature, All Package Types	-55	+125	°C
t_r, t_f	Input Rise and Fall Time (Figure 1)	-	no limit*	ns

*When $V_{IN} \approx 0.5V_{CC}$, I_{CC}> > quiescent current.

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation, V_{IN} and V_{OUT} should be constrained to the range GND≤(V_{IN} or V_{OUT})≤V_{CC}.

Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or V_{CC}). Unused outputs must be left open.

DC ELECTRICAL CHARACTERISTICS(Voltages Referenced to GND)

Symbol	Parameter	Test Conditions	V_{CC} V	Guaranteed Limit			Unit
				25 °C to -55°C	≤85 °C	≤125 °C	
V_T+max	Maximum Positive-Going Input Threshold Voltage	V_{OUT}=0.1 V $\|I_{OUT}\| \le 20\ \mu A$	4.5 5.5	1.9 2.1	1.9 2.1	1.9 2.1	V
V_T+min	Minimum Positive-Going Input Threshold Voltage	V_{OUT}=0.1 V $\|I_{OUT}\| \le 20\ \mu A$	4.5 5.5	1.2 1.4	1.2 1.4	1.2 1.4	V
V_T-max	Maximum Negative-Going Input Threshold Voltage	V_{OUT}=V_{CC}-0.1 V $\|I_{OUT}\| \le 20\ \mu A$	4.5 5.5	1.2 1.4	1.2 1.4	1.2 1.4	V
V_T-min	Minimum Negative-Going Input Threshold Voltage	V_{OUT}=V_{CC}-0.1 V $\|I_{OUT}\| \le 20\ \mu A$	4.5 5.5	0.5 0.6	0.5 0.6	0.5 0.6	V
$V_H$max Note	Maximum Hysteresis Voltage	V_{OUT}=0.1 V or V_{CC}-0.1 V $\|I_{OUT}\| \le 20\ \mu A$	4.5 5.5	1.4 1.5	1.4 1.5	1.4 1.5	V
$V_H$min Note	Minimum Hysteresis Voltage	V_{OUT}=0.1 V or V_{CC}-0.1 V $\|I_{OUT}\| \le 20\ \mu A$	4.5 5.5	0.4 0.4	0.4 0.4	0.4 0.4	V
V_{OH}	Minimum High-Level Output Voltage	$V_{IN} \le V_T$-min or V_T+max $\|I_{out}\| \le 20\ \mu A$	4.5 5.5	4.4 5.4	4.4 5.4	4.4 5.4	V
		$V_{IN} \le V_T$-min or V_T+max $\|I_{OUT}\| \le 4.0$ mA $\|I_{OUT}\| \le 5.2$ mA	4.5	3.98	3.84	3.7	
V_{OL}	Maximum Low-Level Output Voltage	$V_{IN} \ge V_T$+max $\|I_{OUT}\| \le 20\ \mu A$	4.5 5.5	0.1 0.1	0.1 0.1	0.1 0.1	V
		$V_{IN} \ge V_T$+max $\|I_{OUT}\| \le 4.0$ mA $\|I_{OUT}\| \le 5.2$ mA	4.5	0.26	0.33	0.4	
I_{IN}	Maximum Input Leakage Current	V_{IN}=V_{CC} or GND	5.5	±0.1	±1.0	±1.0	μA
I_{CC}	Maximum Quiescent Supply Current (per Package)	V_{IN}=V_{CC} or GND I_{OUT}=0μA	5.5	1.0	10	40	μA
ΔI_{CC}	Additional Quiescent Supply Current	V_{IN} = 2.4 V, Any One Input V_{IN}=V_{CC} or GND, Other Inputs		≥-55°C		25°C to 125°C	mA
		I_{OUT}=0μA	5.5	2.9		2.4	

Note. $V_H$min>(V_{T+}min)-(V_{T-}max); $V_H$max=(V_{T+}max)+(V_{T-}min).

AC ELECTRICAL CHARACTERISTICS(V_{CC}=5.0 V ± 10%, C_L=50pF,Input t_r=t_f=6.0 ns)

Symbol	Parameter	Guaranteed Limit			Unit
		25 °C to -55°C	≤85°C	≤125°C	
t_{PLH}, t_{PHL}	Maximum Propagation Delay, Input A or B to Output Y (Figures 1 and 2)	25	31	38	ns
t_{TLH}, t_{THL}	Maximum Output Transition Time, Any Output (Figures 1 and 2)	15	19	22	ns
C_{IN}	Maximum Input Capacitance	10	10	10	pF

C_{PD}	Power Dissipation Capacitance (Per Gate) Used to determine the no-load dynamic power consumption: $P_D=C_{PD}V_{CC}^2f+I_{CC}V_{CC}$	Typical @25°C,V_{CC}=5.0 V 27	pF

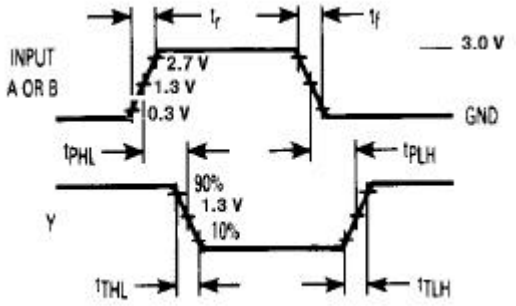

t_r
t_f
3.0 V
INPUT
A OR B
2.7 V
1.3 V
0.3 V
GND
t_{PHL}
t_{PLH}
90%
1.3 V
10%
Y
t_{THL}
t_{TLH}

Figure 1. Switching Waveforms

Figure 2. Test Circuit